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*"Today, world events mandate a need to project non-lethal force across all levels of war to enable our warfighters and leaders to effectively deal with a host of traditional, as well as non-traditional threats. Now more than ever, the minimal level of public tolerance for collateral damage and loss of human life, coupled with the tendency for the typical adversary to exploit our rules of engagement to his benefit, necessitates an effective and flexible application of force through non-lethal weapons.*

*As the Department of Defense Executive Agent for the Joint Non-Lethal Weapons Program, I intend to meet this challenge by pursuing the development of a new generation of non-lethal weapons -- an effort to leverage 21st century technology to enable our warfighting CINCs to capitalize on a full-spectrum non-lethal capability."*

A handwritten signature in black ink that reads "James L. Jones".

General James L. Jones  
Commandant of the Marine Corps  
Executive Agent  
Joint Non-Lethal Weapons Program



## Foreword



The Joint Non-Lethal Weapons Program (JNLWP) is chartered to develop and provide to the Department of Defense, a fully integrated and coordinated Non-Lethal Weapons Program that meets the intent of Congress and provides the best non-lethal weapon technologies and equipment for our Operating Forces.

A major step in fulfilling this requirement is to continue to examine and analyze the potential contributions of non-lethal weapon technologies in meeting the Commanders-in-Chief (CinCs) future warfighting requirements.

In 1999, the JNLWP Integrated Product Team sponsored a study titled “*Joint Vision for Non-Lethals: Meeting the Demands of Future Military Operations.*” This study used a strategy-to-task-to-technology methodology that will form the foundation for a Department of Defense Non-Lethal Weapons Joint Mission Area Analysis in 2000. In addition, the Council on Foreign Relations study titled “*Non-Lethal Technologies: Progress and Prospects*” and the Center for Strategic and International Studies study titled “*Non-Lethal Weapons National Policy Study*” have examined the strategic implications of non-lethal weapons. Both studies encourage a robust science and technology effort as we begin to take the Joint Non-Lethal Weapons Program beyond the rubber-bullet modality.

Our allies are also moving forward, expanding the exploration and utilization of non-lethal weapons as demonstrated by our recent International Exchange Agreements with Great Britain and Israel and the NATO Policy on Non-Lethal Weapons adopted in September 1999. Similarly, the ongoing U.S. and United Kingdom wargame series will demonstrate how and where non-lethal weapons can contribute to meeting our warfighter’s requirements.

On the home front, forward progress has been achieved with four of our acquisition programs reaching scheduled milestones. Refinements in the Non-Lethal Weapons Instructor Course, expansion of non-lethal weapons into modeling and simulation, and the formation of the Human Effects Process Action Team reflect our commitment to enhancing the Program for all participants. The Technology Investment Program continues to find new and innovative non-lethal technologies that lay the groundwork for future programs.

As we look to the future, the JNLWP will continue to meet developing requirements and challenges by aggressively engaging in the exploration and leveraging of new technologies that will provide our commanders and warfighters with much needed enhanced operational capabilities.

A handwritten signature in black ink, appearing to read 'R. P. Ayres, Jr.'.

**R. P. AYRES, JR.**

**Lieutenant General, U.S. Marine Corps  
Chairman, Joint NLW Integrated Product Team**





# Annual Report 1999

## Joint Non-Lethal Weapons Program: A Year in Review



## The Way Ahead

As we move into the new millennium, the United States continues to meet rising contingencies by using its military capability across all levels of the spectrum including peace operations and humanitarian assistance. The U.S. military and related activities shape and promote global security with forces that are manned, trained, equipped to deter and, if necessary, to fight and win conflicts when this Nation's vital interests are threatened. On occasion our vital interests are not specifically affected, however; the military is still required to protect and preserve such basic ideals as the right to life and relief from human suffering.

As identified in the Quadrennial Defense Review (QDR) and restated in the January 5, 2000 National Security Strategy (NSS) for a New Century, the three tenets for U.S. national security include:

- Shaping the international environment
- Responding to threats and crises
- Preparing for an uncertain future

Since a military peer competitor for the U.S. is highly unlikely in the near future, a shift from the philosophy of overwhelming power will be required in order to promote regional stability and shaping of the international environment. (Even though confrontational states will continue to use overwhelming

force and lethality to their advantage, there will be times where a response of overwhelming U.S. force is inappropriate.) These reasons, combined with society's reluctance to take or inflict casualties, require policy and decision-makers to find alternative tools for employment of force in order to deter the world's aggressors.

The Joint Vision for Non-Lethals and the QDR confirmed that Small Scale Contingencies (SSCs) will continue to remain high for the foreseeable future of 15 to 20 years. SSCs cover a full range of military operations including show of force, intervention, peacekeeping, humanitarian





assistance, etc. Such operations call for low or no casualties and limited collateral damage. Limiting collateral damage in the full spectrum of threats and crises, to include Major Theater Wars (MTWs), is critical to expediting the restoration of order to the affected region or nation. As stated in the NSS, the increase in asymmetrical threats and crises and our ability to respond at home and abroad means the U. S. must be selective and focused on challenges that directly affect our interests, engaging only in those areas where we can make a significant difference.

Contingency operations associated with SSCs, deterrence and conflict prevention will continue to require a capability for rapidly and effectively controlling unruly populace or belligerent forces and for keeping potentially explosive situations from escalating. The advent of non-lethal weapons systems will enhance our ability to effectuate precision engagement; provide a broader range of desired, precisely directed target effects; and significantly reduce undesired personal injury and material damage.

The preparation, training and

equipping of the U.S. military must be made with due consideration to the limitations and challenges posed by the tenets described above and the battlespace of the future. In order to accomplish these tasks, we must use the most appropriate tool or combination of tools which will help the U.S. prepare for a critical part of the NSS – the uncertain future which may not hold one type of war where precision, speed and lethality are at the forefront. For this reason, we must search for ways to meet and achieve our objectives by other than traditional lethal means, keeping in mind that the protection of our Homeland and friendly forces must be foremost in this “Revolution in Military Affairs.” For its part, the JNLWP will continue to pursue non-lethal technologies that will introduce new dynamic opportunities to the battlespace of the future by providing our Commanders and policy makers additional options that fall between non-military action and the full use of lethal force.



# 1999 Accomplishments

Making it Work

## Modular Crowd Control Munition (MCCM)

In just two short years since the JNLWP was established, the MCCM became the first JNLWP funded acquisition program to reach a Milestone (MS) II decision. This effort will field a non-lethal variant of the Claymore munition. The lethal fragmentary payload is replaced with numerous rubber ball blunt impact munitions for use in the dispersal of hostile crowds and integration into a layered perimeter defense. The MCCM is intended to be used both as a ground emplaced (GE) munition and also as a vehicle-mounted system (VMS) with four sided coverage on HMMWVs, 2.5 and 5 ton trucks. This system has a 5-15 meter effective range, with an estimated cost of \$297 per MCCM and \$3,707 per system.

Due to the relative maturity of the GE MCCM and the aggressive program schedule, funding in FY97 and FY98 was used to prepare program documentation, design prototype, fabricate, test hardware, and design of the munition based on the results of the prototype tests. As a result, the Program

Manager for Mines, Countermine, and Demolitions (MCD) at Picatinny Arsenal, NJ achieved a MSIII decision on 16 July 1999 which gave approval to move into the Production, Fielding/Deployment and Operational Support Phase. Army procurement began in FY99 and the Marine Corps is scheduled to procure MCCM VMS in FY00. Initial Operating Capability (IOC) is scheduled for FY00. The MCCM VMS is scheduled for a MSII decision in 2QFY00 which, if successful, will allow the VMS program to move into the Engineering, Manufacturing and Development (EMD) phase. MCCM VMS MSIII is scheduled for 4QFY00.

## 40mm Crowd Dispersal Cartridge

This stingball round will be launched from the M203 Grenade Launcher and will have a 15-30 meter effective range. The Operational Requirements Document requires this round to have a 90% probability of hitting four out of five targets at 30 meters. It will be used to deter, delay and/or distract for crowd control purposes, and to increase the standoff distance between friendly forces and a hostile crowd. During FY99, the U.S. Army (USA) released a market survey and a request for proposals (based upon a performance specification) on this round. On 19 Apr 99, they achieved a MSI/II decision entering into the Engineering and





Manufacturing Development Phase. They received the bid samples, accomplished the bid sample test and began the Joint Source Selection Evaluation. Early in FY00, they awarded a contract to Deftech for a .48 caliber ball round. The USA is the Requirements and Acquisition Lead for this Joint NLW Program. The USMC, USAF and the USCG are Participating Acquisition Services. The estimated cost is \$17/round.

### Non-Lethal Rigid Foam (NLRF)

The focus of this Rigid Foam program is to develop a capability to temporarily delay access to building openings during Military Operations in Urban Terrain (MOUT) and to temporarily disable selected equipment. It is envisioned that the NLRF will be a hand held,



single-use dispenser (resembling a BIC pen) containing a polyurethane/epoxy foam

material for the Marine, Soldier, Sailor, and Airman to use in sealing doors and windows. MARCORSYSCOM at Quantico, VA achieved a Milestone I on 13 January 1999, which gave approval to move into the Program Definition Risk Reduction (PDRR) phase. The program also had a successful Concept Design Review. A Milestone II is scheduled for 3QFY00 with IOC scheduled for 3QFY02, and Full Operating Capability

### 66mm Vehicle Launched Non-Lethal Grenade

This program is developing and fielding a short-range, indirect fire, crowd control/area denial non-lethal capability that can be employed from the existing vehicle mounted 66mm Light Vehicle Obscuration Smoke



System (LVOSS). Two payloads were selected for this program by the requirements community. The first is a blunt trauma munition with approximately 450 .32 caliber rubber balls inside a rubber housing attached to a metal base. The second is a distraction ("flash-bang") round made of a polyurethane material. The rubber ball grenades will eject rubber pellets while the distraction device will create an audible and visible distraction. Both rounds have the same effective range of 50-100 meters. This program will enhance the capability of friendly forces to conduct force protection without direct contact with rioting crowds. In application it will disperse



and control crowds by temporarily incapacitating, confusing, and / or disorienting the targeted group. It will



also enforce standoff distances and deter potential threats. The PM Smoke at Aberdeen Proving Grounds, MD achieved a Milestone I on 29 July 1999 which gave approval to move into a combined PDRR phase and EMD phase, leading to Type Classification in 1QFY01. The program is maintaining a streamlined program schedule which reduced the fielding time frame from 5 years to 3.5 years. IOC is scheduled for 4QFY01 and Full Operational Capability (FOC) in FY03.

### **Portable Vehicle Arresting Barrier (PVAB)**

PVAB utilizes a pre-emplaced capture system that will stop up to a 7,500 pound vehicle traveling up to 45 mph within 200 feet without causing permanent or serious injury to seat-belted occupants and minimizing damage to the vehicle. The PVAB system consists of the capture net, capture lines, two low-pressure erector



assemblies, four 16-inch anchor plates, attaching hardware, six bump modules, two brake box assemblies and a control system assembly. It can be emplaced by three people in under 2 hours.



The major objective of PVAB is to provide security forces the capability of area denial and enforcement of roadblock operations with a non-lethal capability when rules of engagement prevent the use of more dangerous enforcement options. PVAB will be used on unit perimeters, dismount points, check points and roadblocks to prevent unauthorized access by wheeled vehicles into or out of protected areas. FY99 PVAB



efforts consisted of Health Hazards Analysis definition and testing, and Developmental and Operational Testing that resulted in design changes to the system. The U.S. Army is the Requirements and Acquisition Lead for this Joint Program with the USMC and USAF as Participating Acquisition Services.

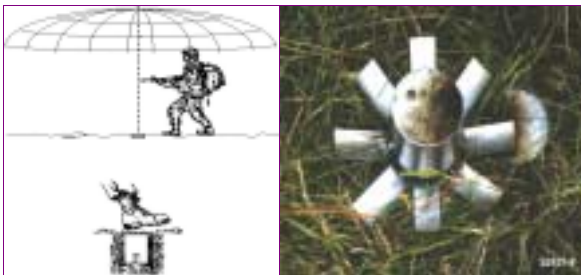


## Bounding Non-Lethal Munition (BNLM)

The USA is developing a BNLM that is similar to the M16A2 Anti-Personnel Mine that will be hand-emplaced by Soldiers, Airmen or Marines. The non-lethal mines are



envisioned to contain stingball, net rounds or marker payloads. They will be used to delay or deter for Area Denial Missions. The Operational Requirements Document requires the stingball payload to have an effective radius of 5-10 meters. The net payload must deter an adversary for 5-15 minutes, and the marker round must have a 5-10 meter effective radius and the marker must be visible from 100-200 meters in day and night operations. The FY99 efforts included the design, development and engineering testing of the prototype mines and payloads. The USA also worked with the USMC to definitize and prioritize the payloads, and began analyzing the NBC requirements and recovery/reuse issues. The USA is the Requirements and Acquisition Lead Service for this Joint NLW Program.



## Canister Launched Area Denial System (CLADS)



The CLADS design is leveraged from the existing Volcano Mine Dispenser System. CLADS will consist of a 20 canister launch rack (with each canister containing four stingball submunitions) mounted on the back of a HMMWV or a 1.5 ton trailer. The Operational Requirements Document requires the stingball submunition to have a 5-10 meter effective radius and the launcher rack must deploy the submunitions out to 100 yards. CLADS will be used to rapidly dispense a minefield for Area Denial, Crowd Control and/or to Deny Contact between hostile factions. The USA FY99 efforts consisted of designing, fabricating and testing/demonstrating the launcher rack (and submunition) and integrating it onto (and launching the submunition from) a HMMWV. The USA also began addressing the Volcano Dispenser Control Unit for consideration for replacement. They also began Service discussions on the requirements for Air Launch compatibility, NBC requirements, submunition recovery/reuse, etc. The USA is the Requirements and Acquisition Lead Service for this Joint NLW Program.

*Publishers Note: Due to significant cost, schedule and performance issues, the IPT recently recommended termination of the BNLM and CLADS programs.*

## Joint Non-Lethal Individual Weapons Instructor Course

The Joint Non-Lethal Individual Weapons Instructor Course (NIWIC) is a two-week, "train the trainer" course designed to make the graduates capable of instructing their units in the employment of non-lethal weapons. Taught by both Marine and Army instructors, the JNLWIC is designed as a resident course; however, Mobile Training Teams (MTTs) have been conducted in the past upon request. As more students graduate the course, MTTs will be discontinued. During FY99 and the first part of FY00, NIWIC was approved and is now being held at the Marine Corps Detachment, Fort Leonard Wood, MO. Annual school seats are allocated to all Services based on Service input from the Interservice Training Review Organization (ITRO) process.

## Human Effects Process Action Team

Human effects are a fundamentally crucial element of non-lethal weapons (NLWs) development and employment. It is of prime importance to understand the safety margins related to permanent injury or death in a sufficiently quantitative manner, as well as the operating envelopes where NLWs will effectively perform their mission. Political leaders need to understand the risks associated with a decision to deploy these weapons. Military leaders and the front line users need to understand and have confidence in each weapon's effective operating parameters, and materiel developers need to understand what performance requirements they must design and test to. In FY99, the JNLWP chartered a Human Effects Process Action Team (HEPAT). The purpose of the



HEPAT was to make recommendations on the process used by the DoD to quantify non-lethal human effects. Since its first meeting in June 99, the HEPAT has reviewed the missions, resources, and processes of several DoD organizations involved in medical and bio-effects research, and has concluded that none can be applied directly to fulfill the need to characterize NLW human effects. This was attributed to the very new nature of NLW development and the dramatic differences from lethal weapons in defining effectiveness criteria. The wide breadth of technologies being contemplated for NLWs, coupled with the large statistical variations in the physiology and psychology of the human target, significantly complicate how NLWs are specified, designed, tested and employed.

The HEPAT also examined processes that review and assess health and safety aspects of weapon system development, such as the Army's Health Hazard Analysis (HHA) process and the Navy's Weapon System Explosive Safety Review Board (WSESRB) in search of a model to use in the development of a specific process for assessing NLW human effects.

The team will recommend the establishment of a Non-Lethal Human Effects Center of Excellence (COE) to become the JNLWP's centralized resource for health effects. The COE would be the human effects "one-stop-shop" resource for NLW

program managers. Among other duties, the COE would also act as the central repository of human effects data, maintain a source listing of qualified agencies capable of conducting any needed new testing and analyses, and coordinate human effects modeling and research efforts. The HEPAT will also recommend the creation of the Human Effects Review Board (HERB) to function as a more senior, independent body to provide advice and recommendations to the program managers and Milestone Decision Authorities on human effects.

The HEPAT will finalize its findings and recommendations and begin coordination with the Service's acquisition and Surgeon General organizational chains beginning in February 2000. The end result is expected to be formal designation and establishment of the new JNLWP human effects infrastructure and processes. This is expected to occur by Summer 2000.

# Building the Framework

Making it Work

## Revised Memorandum of Agreement

In 1999, the Memorandum of Agreement among the Services and USSOCOM for the Joint Non-Lethal Weapons Program was revised. After three years of program efforts, it was found that management adjustments were necessary in order to fulfill the original congressional intent and Public Law 104-106. Among the more notable changes in the MOA was the replacement of two flag level oversight groups (the Joint Acquisition Group and the Joint Concepts and Requirements Group) with a single O-6 level group designated as the Joint Coordination and Integration Group. In addition, a Concepts and Requirements Division was added to the Directorate's organizational structure to allow for more joint Service representation across the three divisions, and the inclusion of an Executive Director billet to be manned by the U.S. Army in FY00.

Included in other prominent changes to the MOA was additional clarification of program policy regarding JNLWD functioning which further refines the Directorate's responsibilities as "...insight, not financial oversight..." with regard to Service-unique systems.

Although the revised MOA maintains the JNLWD focus on efforts to enhance and improve the tactical applications through the development of current NLW acquisition programs, it also provides for the leveraging of technologies that have applications at multiple levels of war.





## Joint Staff J-39 Memorandum of Agreement

In June 99, the JNLWD and Joint Staff J-3/J-39 signed a Memorandum of Agreement (MOA) to support the rapid (quick) response capability needs of Combatant Commanders. Under the MOA, the JNLWD will identify existing or rapidly emerging non-lethal technologies that have potential for meeting the CinCs' requirements.

When specific technology/requirement matches are identified, the Directorate will recommend the appropriate Lead Services or agencies to execute the projects for rapid development. Each designated Lead Service or agency, under the oversight of the JNLWP management structure, will develop a management plan outlining the objectives, technical approach, major risk areas, cost, schedule, and fielding/deployment plan. Additionally, the Lead Service/agency will conduct the necessary rapid prototype development, testing and evaluation, and support of the transition of fieldable prototype equipment to Combatant Commanders, Service components, or other government agencies for operational use at the discretion of the CinCs. Technical support for CONUS and/or OCONUS deployment and operator training of capabilities prior to the start of actual operations will also be made available.

The Directorate will use its existing requirements process to identify and validate long-term NLW requirements for quick reaction capabilities in order to determine future needs for follow-on acquisition programs. It will also maintain a database of quick response results and serve as corporate memory for J-3/J-39 on these activities. The JNLWP will budget annually to support CinC quick response requests that are non-lethal



related. In FY00, the allocated budget is \$400K. However, funding may also be provided by the Chairman of the Joint Chiefs of Staff to supplement shortfalls or to support more extensive requirements that may arise. Additional support may also be accepted from other U.S. Government sources to leverage and exploit new or existing applicable technologies.

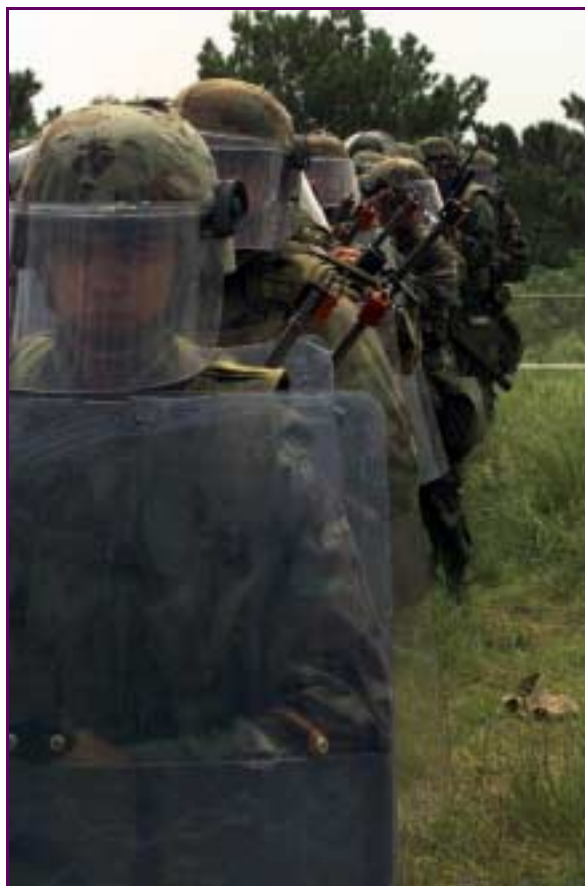
## National Policy Study

The United States military will continue to be used as an instrument in the conduct of foreign policy, as it should be since it is one of this nation's elements of national power. However, in situations where military conflict or its potential have occurred, the U.S. is handicapped when it is faced with the dilemma of balancing the national-level security objectives while substantially minimizing human casualties and infrastructure damage. This deficiency is readily apparent to our foreign political opponents who exploit U.S. aversion to innocent civilian casualties and destruction of the infrastructure that will require restoration after the conflict. Our allies and friends find it more difficult to support U.S. military actions when faced with these consequences of military action. It has been expressed that Non-Lethal Weapons (NLW) may help rectify this problem; however, the

technologies have been focused at the tactical level rather than long-range and large-scale weapons that would be useful as instruments of national policy.

At issue is whether a national-level policy was required to focus the fielding of weapons to serve the purposes described above. On October 1, 1998, the Center for Strategic and International Studies (CSIS) was chartered to conduct such a study and on February 5, 1999, they published the “*Non-Lethal Weapons Policy Study—Final Report*”. The objective of the study was to examine the need for, and if needed, outline the nature of, a national level policy on non-lethal weapons.

The study analyzed in depth the following issues: (1) political and diplomatic need for additional military options that could be enabled by the employment of long-range, large-scale non-lethal weapons;



(2) types of future situations in which non-lethal weapon systems could provide the U.S. with significant political-military advantages; (3) ramifications of fielding and employing such weapons with regard to arms control, international law, and public acceptance and public support for military action; (4) possible deterrence of aggression achieved through a combination of declaratory policy and visible possession of such capabilities; (5) types of weapons and general concepts of operations, technical and operational feasibility, and estimated costs and affordability; (6) the specific need for a national policy, as distinct from the DoD policy, and if needed, the nature of the policy.

The following issue impacted the recommendations contained in the study. “The significant value of strategic applications on non-lethal technologies identified in the policy portion of this project was predicated on the assumption that *the weapons can be made to work as advertised*. It is currently not known if they can.” In view of this, the study recommended that:

- A national policy on non-lethal weapons is not warranted at this time;
- An outward national policy based on NLW systems that do not exist would be problematic;
- An inward policy encouraging the pursuit of non-lethal technologies for strategic applications is not warranted since the DoD has already recognized the potential strategic utility of NLW and can take appropriate action on its own to the extent that such action is affordable among competing priorities;
- The depth and accuracy of the study group’s understanding of the actual technological possibilities is generally not sufficient to justify a national policy; and

- *If and when* the capabilities are fielded, there would be substantial value to adopting a declaratory policy.

The Non-Lethal Weapons Policy Study – Final Report recommended that the Executive Agent be asked to establish and manage a three-year program to:

- Conduct expanded Science and Technology activities to address the issues identified above for the leading technologies
- Conduct an Analysis of Alternatives for a weapons platform suitable for strategic applications of non-lethal technologies
- Facilitate the Development of Mission Need Statements
- Establish Milestone 0 (Concept Exploration) activities if appropriate

It was estimated that these measures would cost roughly \$100 million which is four times the current (tactically-oriented) JNLWP budget of \$25 million per year.

## Foreign Interaction

Over the past year, the JNLWD had numerous foreign inquiries on DoD Non-Lethal Weapons (NLW) efforts. In response, the Directorate has provided overview briefs to France, Italy, Germany, Republic of Korea, Japan and the United Kingdom (UK), and replied to correspondence from many others such as Australia, Columbia, Sweden, Canada and Norway. In addition, the Directorate established a NLW Information Exchange Agreement (IEA) with the UK in February 1998, and had two exchange meetings in 1999 which focused on topics



such as Modeling & Simulation, Crowd Behavior, Training, Doctrine, Anti-Personnel Landmine Alternatives, NLW Vision, and Lasers/Dazzlers. Initial planning for a combined US/UK wargame series began in FY99 with the first event scheduled for 2QFY00. The JNLWD also signed a NLW Data Exchange Agreement with Israel in September 1999, and tentatively established an initial meeting for 2QFY00.

Another area where the JNLWD has been instrumental is the development of NATO's Non-Lethal Weapons Policy. This policy, adopted on 27 September 1999 by NATO's highest political party, will serve two main purposes. The first will be to clarify legal issues surrounding the use of NLWs and the second is to expand the range of operational capabilities for the Commanders of Military Operations Other Than War (MOOTW). The policy provides useful guidance in the development of doctrine and strategy and has already won early support from NATO's top officers who believe that NLWs will prove to be a tremendous asset throughout the spectrum of warfare.





According to the October 99 press release, NATO expects that “Non-Lethal Weapons should enhance the capability of NATO forces to accomplish military missions and tasks in situations and conditions where the use of lethal force, although not prohibited, may not be necessary or desired; discourage, delay, prevent or respond to hostile activities; limit or control escalation; improve force protection; repel or temporarily incapacitate personnel; disable equipment or facilities; and help decrease the post-conflict costs of reconstruction.”

The policy mandates that “in all cases NATO forces shall retain the option for immediate use of lethal weapons consistent with applicable national and international law and approved Rules of Engagement, and that Non-Lethal Weapons shall not be required to have zero probability of causing fatalities or permanent injuries. However, while complete avoidance of these effects is not guaranteed or expected, Non-Lethal Weapons should significantly reduce such effects when compared with the employment of conventional lethal weapons under the same circumstances.”

Consistent with the JNLWP policy,

NATO’s policy states that “the research and development, procurement and employment of Non-Lethal Weapons shall always remain consistent with applicable treaties, conventions and international law, particularly the Law of Armed Conflict as well as national law and approved Rules of Engagement.”

## Joint NLW Security Classification Guide

The chairman of the Joint Non-Lethal Weapons Program (JNLWP) Integrated Product Team (IPT), LtGen Ayres, signed the JNLWP Security Classification Guide (SCG) on 20 September 99. The SCG establishes policy and guidance and uniform criteria for the security classification of information related to non-lethal weapon’s programs. This includes Research, Development, Test and Evaluation (RDT&E), application, production and operations concerning program susceptibility and weaponization efforts and their applications for military purposes. The SCG provides an easier and friendlier guide for assigning proper security classification to JNLWP funded efforts. This guide did not create new classification. However, it did combine various other related SCGs to form one SCG.

As of 29 October 1999, the JNLWP SCG was distributed to all funded JNLWP efforts. In addition to the SCG, JNLWP program managers and contractors received a survey consisting of 400 questions designed to assess current security classification issues and any concerns related to the SCG. The data compiled from the questionnaires will be utilized to develop separate program SCG annexes, which is scheduled for completion by the end of FY00.

# 1999 NEW INITIATIVES

Making it Work

## Joint Mission Area Analysis



The Joint Staff's requirements generation system forms one of the Department of Defense's (DoD's) three principal decision support systems. The requirements generation system produces information for decision-makers on the projected mission needs of the warfighter. Recent Service and Commanders in Chief (CinCs) experiences during deployments, exercises, and experiments have confirmed the need for non-kinetic and limited effects weapons and munitions capabilities to meet operational needs. Each Service and the CinCs have active Mission Needs Statements (MNS) for NLW capabilities and the CinCs continue to surface the requirement for non-lethal and non-kinetic technology in their Integrated Priority List (IPLs).

In 1999, the JNLWP sponsored a study titled, "Joint Vision for Non-Lethals: Meeting the Demands of Future Military Operations." The entire study is an extensive and comprehensive analysis that forms the basis and foundation for a Joint Mission Area Analysis (JMAA) for NLWs. The study presented opportunities for NLWs that were not previously addressed by the JNLWP. The JMAA is needed to identify and analyze

known operational deficiencies, review required operational capabilities, examine the ongoing development of non-lethal technology, revisit the six non-lethal functional areas and address those opportunities presented in the study. The JMAA provides the framework and an opportunity to coordinate and consolidate common needs and initiate the development of joint requirements that are identified in the CinCs Operation and War Plans.

The JMAA effort represents an important next step for the JNLWP since it will provide an opportunity to apply the study's approach with inputs from the Joint Staff and CinC's representatives. A key output of the analysis would be a consensus on Joint Mission Needs Statements (JMNS) and/or Capstone Requirements Documents (CRD).

The JNLWP plans to conduct an initial JMAA conference in March 2000. Invitees will include all the CinCs, Services, Joint Staff, DoD agencies, the CIA and other departments within the government that have a stated interest in NLWs.

## CINC / Joint Staff Engagement

The JNLWD is currently engaged in several initiatives involving interaction with the Joint Staff and the Warfighting Commanders-in-Chief (CinCs). During 1999, JNLWD staff members presented information briefings to the CinCs about how and where NLWs can make significant contributions to the warfighters. The JNLWD also continued its participation in two of the Joint Staff Joint Warfighting Capability Assessments, specifically the Land Littoral Warfare JWCA (via the Urban Working Group) and, most recently, the Information Operations JWCA.

The JNLWD is also working with the Joint Forces Command (JFCOM) J-9 on integrating NLW systems, particularly non-kinetic munitions, into Limited Objective Experiments and the overall Joint Experimentation Campaign Plan 2000. The JNLWD is assisting JFCOM in investigating the potential that these alternative limited effect technologies might offer to the NCA as alternatives to kinetic weapons in crisis situations. Both the CinC effort and the J-9 initiatives were coordinated with the J-8. Additionally, the JNLWP proposal for a formal Joint Mission Area Analysis for NLWs was discussed.

## Urban Working Group

JNLWP representation and participation with the Urban Working Group (UWG) in the Urban Warfare study effort has been very productive and will continue to be for the next 18 to 24 months. The UWG provides a critical forum for JNLWP efforts to disseminate the operational utility of NLW systems and their relevance across the spectrum of warfare to the DoD operational community. The JNLWP's participation in the UWG process has also facilitated



attendance at Joint and Service sponsored war games, seminars and conferences which provide additional forums for disseminating JNLWP information.

The UWG is currently conducting an Urban Operations (UO) Study as a component of the Joint Staff (J-8) Land and Littoral Joint Warfighting Capabilities Assessment. The Phase I report noted in very strong terms that there was a need for NLW systems capabilities in order to successfully implement the emerging Concepts for Joint UO. The study is also examining Mission Needs Statements (MNS) and assessing these MNS for their impact on identified UO capability gaps. The JNLWD will also provide input in the form of a JMNS for NLWs in support of Joint UO. Phase II of the UO Study has generated a draft report which should be available for staffing comments by the end of 2QFY00, with a final report expected by the end of the year. As a result of the MNS review, the UWG has identified the acquisition of NLWs as a key component in developing or enhancing the U.S. capability to conduct more effective joint operations in the urban environment. This position is based upon the results gleaned from war games, seminars, and urban study efforts.

In addition to the UO study, the UWG continues progress toward an Urban Operations Handbook and Joint Doctrine



Publication, JP 03-06. NLW specific applications and concepts of employment have been inserted into the UO Handbook as a direct result of JNLWD participation in the UWG. Consequently, the JNLWD is also included in the JP 03-06 oversight group, where it expects to accomplish the same purpose and objectives as the UO Handbook. These efforts, coupled with results and interests expressed in other forums, constitute a clear interest in exploring the employment of NLWs at the operational level of warfare in a Joint Task Force directed campaign.

The UWG has also strongly favored further development of the Joint Conflict and Tactical Simulation (JCATS) model, which is of considerable interest to the JNLWP. The Modeling & Simulation requirements for NLWs and the efforts that appear necessary for modeling operations in the urban complex seem to be complementary. Based upon the correspondence between the JNLWD and the J-8, as well as the JNLWP briefings to both the Deputy Director for Joint Warfighting Capability Assessment and Vice Director for Force Structure, Resources, and Assessment (J-8), the JNLWD has been asked to provide a proposal to the J-8 soliciting and justifying funding to support the JCATS Verification, Validation, and Accreditation effort.

Finally, the UWG has been a supporter of the JNLWD effort to conduct a Joint Mission Area Analysis (JMAA) and is facilitating the presentation of the JMAA concept through the Joint Requirements Panel. Participation in the UWG effort has been vital to the forward movement that the JNLWP is currently experiencing in all these important areas.

## Information Operations Joint Warfare Capabilities Assessment

The Joint Staff J-39 invited the JNLWD to formally participate in the Information Operations (IO) Joint Warfare Capabilities Assessment (JWCA). On 21 September 99, the JNLWP Director and Deputy Director for Technology met with the JWCA Study Director to discuss opportunities for cooperation. It was agreed that the JNLWD would participate in the IO JWCA to identify technologies being contemplated or developed in the NLWs arena that might have applicability to IO needs identified by the CinCs. The JNLWD conducted an initial, detailed review of current documentation outlining the IO mission deficiencies and needs and found areas of potential commonality.

The efforts under development will be analyzed further to determine the real potential for application. The JNLWD will continue to participate in the IO JWCA, attending applicable planning meetings and traveling with the team when appropriate.



## United States/United Kingdom Wargame Series

The purpose of the proposed wargame series is to conduct a United States/United Kingdom (UK) Urban Operations wargame program, exploring the possible application and the potential contributions of non-lethal technologies to the conduct of military operations in urban areas. Both the UK and the U.S. have relevant recent and historical experience conducting military operations in urban environments - experience which needs to be evaluated against perceived future requirements to determine what is required for the success of future urban operations. By conducting this wargame series together, both nations will gain greater insight into the potential risks and opportunities presented when future military operations are conducted in the urban environment.

This wargame program will focus on the potential role of NLW systems in those future urban warfare operations. The selected wargame scenario(s) will support an examination of the implications of the application of NLW technology in urban operations across the spectrum of warfare. The wargame scenario will take place during the 2010-2020 time frame, allowing for the use of current and emerging non-lethal technologies. The specific objectives of the wargame program will be determined in consultation between the wargame performers; Marine Corps Warfighting Lab Wargaming Division, the Strategic Assessment Center, and the customer, the JNLWD.

The US/UK NLW Wargaming Program will consist of a series of workshops, seminars and wargames. All of these activities are designed to build upon each other. The first seminar will address overall policy issues associated with NLWs, as well as refine the objectives, scope, issues and participants for the subsequent events in the program.

Specifically, the first seminar will examine political-military issues, rules of engagement criteria, psychological operations, information warfare requirements, and innovative employment concepts. The first wargame and its associated workshop will address the challenges and opportunities associated with the use of NLWs at the tactical level of war. The second wargame and associated workshop will examine the employment of NLWs at the operational level of war. The third wargame and workshop will consider the strategic issues surrounding the employment of NLW technologies and concepts. The final event in the program, the Executive Seminar, will review the key findings and issues from the previous events, identify issues for further consideration, and determine possible future courses of action.

Participants will include representatives from all four U.S. Services, the CinC Staffs, other U.S. Federal Agencies (including law enforcement and first responders), the British Armed Forces, scientists (from government and private industry), academia, and civilian and military Law of War experts.



## Joint Vision for Non-Lethals

### *Meeting the Demands of Future Military Operations*

A Joint working group, composed of active and retired officers, a career diplomat, and defense and technology analysts, conducted a study that addresses the fundamental question, “Can non-lethals contribute to future military operations?” The study group did not confine the analysis to the non-lethal past and present roles or limit itself to looking at non-lethal technologies and their potential or desired effects. The group’s analysis used a comprehensive, traceable approach built from a foundation, “strategy-to-task-to-technology methodology,” with four pillars—alternative futures, operational context, defined military tasks and technologies—and a two-way connection between the pillars. This methodology explicitly examines four alternative future pathways which affect the frequency of threats and crises across different geographic regions and the likelihood of U.S. military involvement.

The four alternative futures were examined using the Scenario Planning Methods. The entire spectrum of threats and crises, from Domestic Emergencies through Global War, were examined and analyzed using 20 distinct types of military operations. All 1547 military tasks, covering the Strategic National, Strategic Theater, Operational and each Service specific task, were assessed as to their relevance regarding the accomplishment of a military operation. The 55 non-lethal technologies were examined relative to their potential ability to support, complement or accomplish each military task. This methodology allowed for a comparison of technologies, not just in terms of their respective effects, but more

importantly in terms of their abilities to accomplish tasks, the relevance of those tasks within an operational context and the frequency of that type of operation and likelihood of U.S. military involvement. This methodology can be repeated as changes occur in any item within the four pillars.

The study results reported that non-lethals: (1) are applicable not just at the tactical level but also at the operational and strategic levels; (2) can play a major role in Force Protection and also Movement/Maneuver and Employing Forces/Fires, with fewer applications for Intelligence, Surveillance and Reconnaissance and Command and Control; (3) can complement but also, for some tasks, offer advantages or unique contributions across the spectrum of threats and crises including Major Theater War (s).





## Concept Exploration Programs

### Counter-Personnel

- ♦ Clear Facilities/Structures of Personnel\*
- ♦ Incapacitate Individuals
- ♦ Crowd Control
- ♦ Deny Area to Personnel\*

### Counter-Material

- ♦ Disable Equipment and Facilities
- ♦ Deny Area to Vehicle, Vessels and Aircraft

\*Area Denial to Personnel (AD-P) and Clear Facilities (CFAC) will be initiated during FY00 with the remainder to begin when funding becomes available.

Early in FY99, the flag-level JNLW Integrated Product Team (IPT) directed that formal Concept Exploration Programs (CEPs) be initiated for each of the six defined NLW functional areas listed above.

During FY99, the necessary Pre-Milestone 0 assessment and planning activities for Area Denial-Personnel (AD-P) and Clear Facilities (CFAC) were conducted. These activities included comprehensive searches for technologies, early assessment of their applicability to the AD-P and CFAC mission areas, and a screening process to scope the viable alternatives. Initiation of these two CEPs are scheduled for the second quarter of FY00 with the U.S. Army and the U.S. Marine Corps as Lead Services for the Phase 0 activities for AD-P and CFAC, respectively.

The two-year CEP efforts will consist of competitive, parallel, short-term development efforts focused on defining and evaluating the feasibility of alternative concepts and providing the basis for assessing the relative merits of the concepts

at the Milestone I decision point, where new acquisition programs will be formally initiated. During the CEP, the various hardware concepts will be developed, fabricated, and tested. Concurrently, operational users from each of the participating Services will jointly define the detailed operational context of the functional area and develop the individual system operational concepts and requirements. Additionally, early life-cycle cost estimates of the competing alternatives will be worked out, taking into account the cost to develop, procure, operate, sustain and dispose of each. These costs will be analyzed relative to the value of the expected operational capability for each alternative during an independently conducted Analysis of Alternatives study. Results from this study will provide the basis for selection of new acquisition programs by the JNLWP IPT. The IPT will assign each new acquisition program to a Lead Service for execution.

## Non-Lethal Acoustics Weapons Program Termination

For almost ten years, the Non-Lethal Acoustics Weapons Program (NLAW) had been researching the use of inaudible sound (infrasound) acoustics with a goal to demonstrate repeatable bio-effects at range in 4QFY99. The Requirements Integration Group (RIG) identified specific transition criteria for a decision demonstration with regard to whether the program should proceed to Milestone 0. Specifically, the program needed to show a prototype device that could produce a reliable, repeatable bio-effect with sufficiently high infrasound amplitude at a minimum specified range.

In August 1999, the Acoustics Program Manager communicated that the effort could not meet the transition criteria. Therefore, the NLAWP was recommended for termination at the Joint Coordination and Integration Group (JCIG) meeting on 22 September 1999. The NLAWP was officially terminated at the 99-03 Integrated Product Team (IPT) meeting.



## Vehicle Mounted Active Denial System (VMADS)

The Vehicle Mounted Active Denial System (VMADS) is a Pre-Milestone 0 effort to develop a directed energy system integrated onto a Highly Mobile Multi-purpose Wheeled Vehicle (HMMWV) platform. The preliminary goal is to demonstrate the system zero unit in the near term as part of a USAF - Force Protection



Battle Lab Demonstration, prior to a Milestone 0 decision. The demonstration is scheduled for June 2000, after which, a decision will be made whether to transition the program to acquisition. Once VMADS is designated as an acquisition program, formal program management will be transferred from Air Force Research Lab to the Air Force Systems Program Office at Hanscom AFB.

Over the last half of 1QFY00, several notable developments have taken place with respect to VMADS. In November, Dr. Hans Mark, Director of Defense Research and Engineering (DDR&E), received a very detailed brief from the program manager and the rest of the VMADS team at Brooks Lab. As a result of the brief, Dr. Mark endorsed the technical aspects of the program through a letter to Major General Richard Paul, Director of the Air Force Research Lab. In a related effort, a technical review team meeting was held later in the month of

November to independently assess the VMADS technology and hardware development. The review panel was comprised of experts from academia and government. After two days of briefings and deliberations, the panel made several concluding remarks, namely, that the program is on sound technical footing and that all hardware development goals are achievable with low risk. The panel did go on to say that the current schedule, to produce the system zero in time for a June demonstration was, in their opinion, a moderate to high risk. A final report providing details is due by the end of January.

## **Joint Forces Command J-9**

### ***LIMITED OBJECTIVE EXPERIMENT 001***

In September, the Joint Forces Command (JFCOM-formerly U.S. Atlantic Command) J-9 Joint Experimentation Division invited the JNLWD to participate in an experiment to identify alternate means of offensive operations that will provide the National Command Authority (NCA) and Joint Force Commanders (JFC) additional operational options when executing a coercive campaign.

The purpose for this Limited Objective Experiment (LOE) is to investigate the potential use of non-kinetic weapons effect/engagements for use in crisis situations. Some of the objectives of this experiment are to ascertain whether the use of non-kinetic alternatives would help to minimize negative long-term effects related to loss of life, reduce collateral damage on infrastructure, and lessen destructive political and economic outcomes associated with

conventional warfare.

It was determined that the Joint Warfighting Center (JWFC) would employ the Joint Conflict and Tactical Simulation (JCATS) to simulate the kinetic and non-kinetic scenarios during the exercise. The JCATS model is expected to provide the analysis team with a useful tool for not only technology comparison, but also to help determine the measures of effectiveness with regard to traditional conflict outcomes such as the number of casualties, sorties, and collateral damage.

The non-kinetic technologies that are being considered as potential candidates for LOE 001 include the Airborne Tactical Laser (ATL), Active Denial Technology (ADT), Low Cost Autonomous Attack System (LOCAAS), caltivate and malodorant payloads, slippery and rigid foams. The experiment is scheduled for 1QFY2000 at JFCOM's Joint Training, Analysis and Simulation Center in Suffolk, VA. Other participants include the Joint Warfare Analysis Center and Lawrence Livermore National Laboratory.





# Supporting Efforts

Making it Work

## National Institute of Justice / JNLWD Cooperation

The JNLWD and National Institute of Justice (NIJ) continue to coordinate and collaborate through frequent information exchange meetings and NIJ's participation as a member of the Joint NLW Integrated Product Team. In 1999, NIJ took part in the Human Effects Process Action Team where they discussed their process for evaluating human effects through modeling, testing, and oversight by their institutional review board process.



This year, the JNLWD and NIJ also collaborated on funding research at Wayne State University in Detroit, Michigan which was designed to further assess and quantify the non-lethality of blunt impact munitions. The JNLWD is also taking advantage of an ongoing NIJ study to gather effects data from actual field use of NLWs by various agencies and governments. This empirical data will be very valuable in better understanding the human effects of NLWs currently under development.

## Non-Lethal Technology and Academic Research Symposium

The first Non-Lethal Technology and Academic Research Symposium (NTARS) was held 3-5 May at the Marine Corps Research Center in Quantico, Virginia in conjunction with Force Protection Equipment Demonstration (FPED) II. The objective of the NTAR Symposia series hosted by the University of New Hampshire is to engage leading professionals from the academic research community in exploring: 1) the sociological dimensions of the need for and use of non-lethal weapons and 2) the technological and medical challenges to the development of non-lethal weaponry, beyond those presently under consideration. Such applications include employment in peacekeeping, conventional warfare, antiterrorism, policing, humanitarian assistance, disaster relief and noncombatant evacuation operations by U.S. military and

law enforcement forces.

NTARS attendees focused on four subobjectives:

- To educate innovative academic researchers about the global social context which is driving the emerging field of non-lethality;
- To expose those academic researchers to active demonstration of today's non-lethal applications, thus extending the boundaries of thinking of the academic community and informing the research process with deeper understanding of the need and opportunity to transfer ideas into useable products;
- To expose leaders and decision-makers attending FPED II to "over-the-horizon" opportunities, thereby bringing the potential of NLWs technology deeper into the planning process; and
- To expose vendors of today's cutting edge technologies to future opportunities for collaboration with the academic community.

During the NTAR Symposium attendees presented, considered, and suggested new concepts deserving of future exploration by the JNLWP and the National Institute of Justice (NIJ) Less-Than-Lethal Program with the goal of improving the research agendas of the JNLWP and NIJ. Planning is currently underway for NTAR II which will likely be held at the University of New Hampshire in August 2000.



## Force Protection Equipment Demonstration II

The second Force Protection Equipment Demonstration (FPED II) was a joint effort sponsored by the Joint Staff's Directorate of Operations for Combating Terrorism, the Office of the Under Secretary of Defense for Acquisition and Technology (OUSD(A&T)), the Department of Justice, and the JNLWP. FPED II was held at Quantico, Virginia from 3-6 May 1999. The primary purpose of FPED II was to expose leaders and decision-makers to commercial-off-the-shelf (COTS) force protection equipment that may prove useful in meeting their force protection needs. A central idea behind the demonstration is that based on their experience, these personnel know what the field needs and can identify COTS solutions when put before them.

FPED II provided visitors from within DoD, Federal departments and agencies, state and local law enforcement and corrections departments with a chance to view one of the largest displays of force protection equipment ever assembled at one point within the United States. There were 366 vendors demonstrating nearly 1000 pieces of equipment. There were 17 categories of equipment represented, featuring everything from very tech-specific Explosive Ordnance Disposal (EOD) equipment to general items

such as intrusion detection sensors, metal, explosive, and drug detection systems, barriers of all types, and non-lethal weapons. This gave the estimated 4000 attendees and participants who passed through FPED II an equipment answer to almost any mission, budget, or operational requirement they could come up with.



## Experimentation Plan

The Joint Non-Lethal Weapons Program Experimentation Plan (JNLWP-EP) will assist in the development and assessment of innovative concepts and leap-ahead technologies that may enhance or create significant improvements to joint doctrine, organizations, training and education, materiel, leadership, and personnel programs (DOTMLP). This Experimentation Plan is a component of the JNLWP Master Plan, and is designed to assist in the improvement of the operational capabilities of future forces by providing capabilities which minimize injury to non-combatants and limit collateral damage. These desired operational capabilities will enhance the ability of the United States to attain and sustain Full Spectrum Dominance well into the 21st century.

The Joint Forces Command (JFCOM) is serving as the Executive Agent (EA) for Joint Experimentation (JE). The JNLWP Experimentation Plan was developed and coordinated with JFCOM (J-9), and was designed to comply with the tenets of Joint Experimentation Campaign Plan 2000. The JNLWP Experimentation Plan has two fundamental purposes. The first is to support existing acquisition programs, the development of new programs and the examination of six functional area-based Concept Exploration Programs (CEPs). The second purpose is to explore emerging concepts as defined by the Joint Vision Implementation Plan, the CINCs and the Services. Overall, this plan has three main elements: **Customers, Opportunities and Restraints:**

- **Customers:** To ensure that the JNLWP's limited experimentation resources are used wisely, an experimentation customer must first be identified. Examples of experimentation customers are: Program Managers, Concept Exploration Managers, Technology Investment Managers, CINCs and Services. CINC experimentation needs will be developed in coordination with JFCOM J-9. Service experimentation needs will be provided via the Service Central Action Officer (CAO). The experimentation customer will be required to ensure that the experiment generates results, which provide insights and findings that serve to answer the experimentation question.
- **Opportunities:** Rather than conducting "non-lethal specific experiments," this plan seeks to capitalize on



existing or planned events by inserting non-lethal system experiments into ongoing wargames, seminars, workshops, exercises, and experiments. This approach keeps costs down and ensures wider exposure to, and dissemination of, non-lethal technologies and concepts.

- **Restraints:** Operating within the limited resources available to joint non-lethal experimentation, this plan promotes a fiscally responsible effort designed to create opportunities to examine and assess technologies and concepts at an early stage. Program managers and other "customers" are encouraged to budget for experimentation within their program line.

Experimentation is an aggressive, innovative process designed to develop new concepts, explore new technologies and examine their potential operational utility. The experimentation plan is a living document and will be published yearly.



## Master Plan

With increasing asymmetrical challenges in the chaotic world of today, non-lethal technologies can critically supplement and augment lethal force in the battlespace. An understanding and education of the opportunities and use of NLWs requires a paradigm shift from existing philosophies that the military provides only deterrence and lethal capabilities to the elements of National Power. The Memorandum of Agreement (MOA) of June 23, 1999 among the Services and the Commander in Chief, United States Special Operations Command, mandates significant JNLWP requirements in order to meet the intent of Congress and provide the best NLW technologies and equipment to support our forces. The following mission, for the JNLWP, has been derived from Congressional and Department of Defense (DoD) directives and from the MOA. *The Joint Non-Lethal Weapons Program is responsible for the centralized development, coordination and integration of Non-Lethal Weapons technologies and systems that will support the Services and Combatant Commanders across the full spectrum of*



To comply with the requirement in the MOA and to support this mission, a JNLWP Master Plan has been prepared for publication. This Master Plan supports Joint Vision 2010 and the Defense Planning Guidance (DPG) by providing a vision, including goals and objectives which will guide the management and execution of the JNLWP. The Master Plan constitutes a comprehensive and holistic program that identifies the interrelationships between all non-lethal development activities that include training, doctrine, concept exploration, requirements generation, new technology pursuits, research and development, modeling and simulation, experimentation, and resource management. The scope of the JNLWP Master Plan addresses all activities and considerations that apply to the development of NLWs requirements,

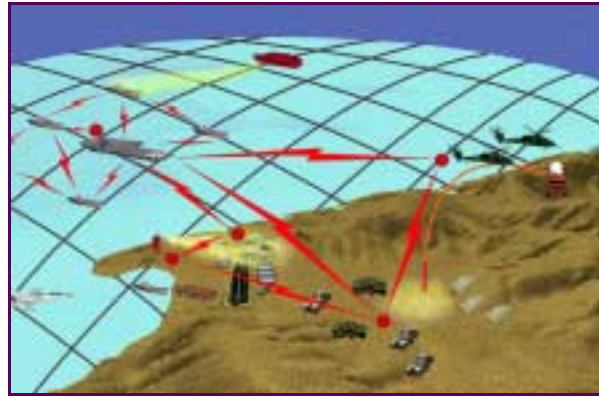
capabilities, and procedures. These considerations are not restricted to operational matters. They also include policy issues, including some matters relevant to the decision to use military options in the furtherance of national interests.

This Master Plan will provide direction for the JNLWP by managing the development of concepts and technologies in support of core capabilities for application across the spectrum of military operations. Additionally, it will be used as a tool for managing and implementing the JNLWP as it evolves through the collaborative efforts of the joint community. The Master Plan's implementation is linked directly with the 21<sup>st</sup> Century Challenges and Desired Operational Capabilities contained in the Chairman of the Joint Chiefs of Staff Instruction (CJCSI) 3010.02 *Joint Vision Implementation Master Plan*.

## Modeling and Simulation

FY99 Modeling and Simulation (M&S) activities for the JNLWP have been focused on the development of analytical tools capable of modeling NLW technologies and engagements in a variety of scenarios including urban terrain. Such an analytical capability has been requested by the joint community and could support a range of activities in concepts and requirements, acquisition and technology down-selection. The challenge has been to integrate NLWs and their effects into a joint model accredited for use as an analytical tool.

Since FY98, the JNLWP has made direct investments into the Joint Conflict and Tactical Simulation (JCATS) model to build NLW functionality. JCATS was selected for NLW application because of its capability to model a range of scenarios from close quarter engagements to joint task force operations,



military operations in urban terrain (MOUT) and multisided conflicts to include the representation of non-combatants. Upon the release of version 2.0 in 1QFY00, updated algorithms and features in JCATS will enable the modeling of many non-lethal systems to include kinetics, directed energy, lasers, chemicals and barriers, with delivery from individual soldiers, ground platforms, air platforms, and indirect fire. Enhancements also include changes in model architecture to allow for the selection of NLWs, the representation of non-lethal effects through entity suppression, electronic and mobility kills, and the control of large numbers of entities (i.e., crowds) during the simulation.

With much of the NLW code enhancements completed, other challenges include the development of valid non-lethal effects for the various technologies of interest as well as a verification, validation and accreditation (VV&A) of JCATS for use as a NLW analysis tool. To prepare JCATS for an analysis of the Non-Lethal Capability Sets, the JNLWP will fund the following tasks in FY99 and FY00: "Non-Lethal Munitions Data Generation" (Army Test Center), "Incapacitation by Blunt Projectiles" (LMS Scientific Models), and "Preliminary VV&A Development Efforts for JCATS" (Dismounted Battlespace Battle Lab Simulation Center - DBBL). In addition, FY00 funds will be provided to Lawrence Livermore National Lab to execute simulation change requests. The final product

will be weapons performance metrics for a variety of existing munitions represented by probability of lethality, probability of incapacitation and estimated time of incapacitation, all as a function of engagement range.

This data will serve as a starting point for NLW data entry into the Joint Munitions Effective Manuals. Furthermore, the DBBL task will involve a limited check of principal algorithms of the simulation and include a level of effort estimate for a full VV&A of the model. At the conclusion of the task, at the end of 3QFY00, JCATS should be ready for a preliminary quantitative analysis study of the Capability Sets. As part of the M&S plan, two studies using JCATS have been proposed to the joint community for consideration.

Study I will analyze the near-term tactical items in the Capability Sets, as part of an Analysis of Alternatives, in the 4QFY00-1QFY01 time frame. The study would be designed to support those Services procuring Capability Set items by somewhat quantifying the tactical contributions of these items, an optimum mix of weaponry within the sets, a basis for a cost benefit analysis, and any gaps or deficiencies in capability within these sets. Such information could provide the Services a rationale for procurement and milestone decision approval of developmental items.

Study II will focus on advanced NLW technologies and could occur in the 1Q-2QFY01 time frame. This study would investigate various non-lethal concepts and delivery means, and develop a rationale for a prioritization of weapons concepts. This prioritization could possibly be integrated with mission area analysis and/or directly support concept exploration efforts and experimentation activities. One final product of the study would be a definitive ranking of advanced NLW concepts based on the merits of the technology and delivery.



Due to the potentially high cost of doing a VV&A, it is important to leverage the resources of other organizations having similar interests. Currently, there is preliminary interest on the part of the Joint Staff J-8 Land Littoral Warfare Analysis Division, Joint Warfighting Center, Joint Forces Command J-9, and Department of Energy in contributing toward such an effort. Attempts to form a viable teaming approach to realize this goal are currently in progress.

### **Non-Lethal Weapons Acceptability Advisory Team**

In 1999, the JNLWP chartered a NLW Acceptability Advisory Team (NLW-AAT) to recommend a strategy that promotes the acceptability of non-lethal weapons and technologies. Composed of representatives of OSD and the Services, it is expected that the NLW-AAT will develop a strategy that includes an overall acceptability plan for the NLW concept and specific acceptability plans for individual technologies. The important components of the acceptability strategy will be policy, public affairs, security, and legal issues. The initial draft acceptability plan is expected to be available in early Spring 2000.



## Central Action Officer

The diverse, multi-faceted nature of the JNLWP has demanded greater coordination between and among the Services and SOCOM. The Director of the JNLWP, through the Joint Coordination and Integration Group (JCIG), made a recommendation during the Spring 1999 JCIG/JIPT meeting cycle to create a Central Action Officer (CAO) group to specifically address this requirement. The recommendation was then formally accepted, an outline proposal developed, and an initial meeting held to begin implementing the effort.

The CAO group will now develop a method that is responsive to the demand for Service inputs and/or requires participation of Service representatives at a variety of meetings. Since the JNLWP is a “collateral” duty for all Service action officers, a more organized and structured process must be developed. The CAO outline proposal contained in the JCIG briefing identified two critical elements: scheduled quarterly meetings for 3-4 days and the assignment of one key officer for SOCOM and the Services as the single POC for NLW matters affecting their organization. Beginning in FY01, the JNLWP has programmed funding to provide one man-year effort to accomplish the CAO functions and responsibilities.



## Airborne Tactical Laser Advanced Concept Technology Demonstration (ACTD)

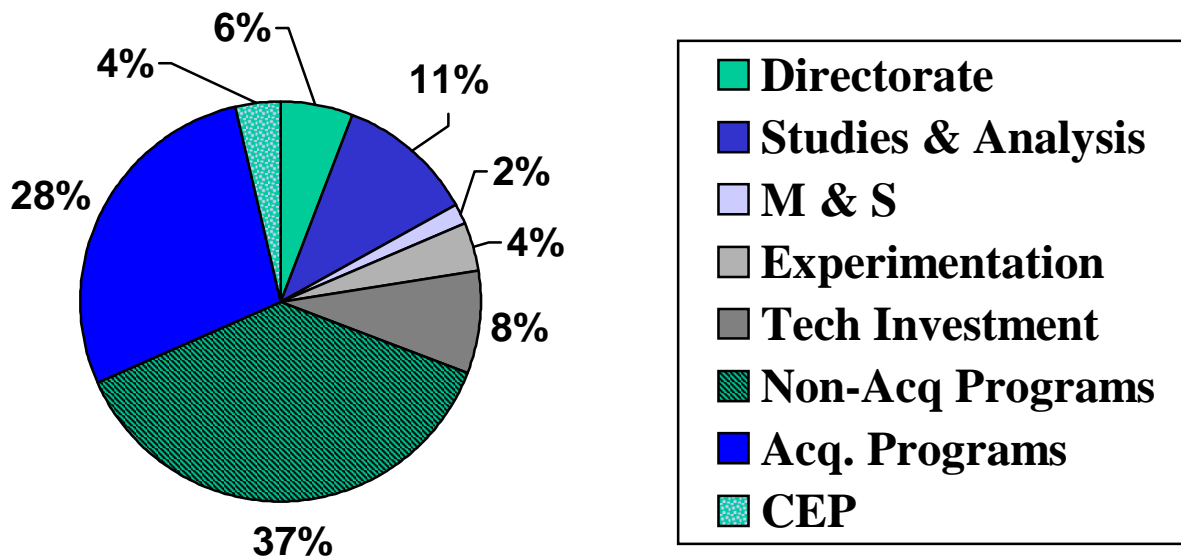


One of the key components of the proposed expanded S&T program is a demonstration of the Boeing Airborne Tactical Laser (ATL) technology. The ATL is designed to operate under a variety of conditions including missile defense, monitoring strategic corridors and choke points, force concentrations, and in escort-mode operations as a threat rollback. In the Special Operations arena, the ATL’s ultra precise, covert capability can be used to create graduated affects by providing both lethal and non-lethal capabilities. Its optical surveillance can be utilized in a medium to low altitude environment for tactical maneuverability.

Additionally, in 1999, under the Technology Investment Program, the JNLWD provided Boeing with funding to conduct a feasibility study to determine effectiveness of an airborne tactical laser to conduct non-lethal engagements. There is growing interest and support by OSD and the Services for conducting an Advanced Concept Technology Demonstration (ACTD) of this technology utilizing V-22 Osprey as the principal aircraft. DUSD (S&T) is currently conducting a “due diligence” study on the merits of this concept with a report out in February 00. Congressional plus-up funding would likely be necessary to fund this ACTD.

# Funding

In 1999, all justified requirements for joint acquisition RDT&E were funded via the Lead Service with highest priority given to the Service-led joint acquisition programs. By allocating approximately 50% of the budget, the JNLWP acknowledged the need to locate, assess, and promote new or emerging technologies that support this requirement. However, this amount of funding was inadequate to support a credible Science and Technology (S&T) effort. Subsequently, the 1999 National Policy Study recommendation for a three-year expanded joint non-lethal weapons S&T effort remains a FY00 program goal. In addition, Studies and Analysis (S&A) funds were heavily invested to support the conduct of the study “Joint Vision for Non-Lethals”, DOTML-P assessments, the efficient initiation of the two inaugural high-level Concept Exploration Programs, and studies to identify the ways and means of assessing target health effects.



## Conclusion



1999 continued the positive momentum that the JNLWP experienced over the previous two years. Counted among the many successes enjoyed this year are the approval of a new program Memorandum of Agreement among the Services, four acquisition programs that reached scheduled milestones, formation of the Human Effects Process Action Team, refinement of the NLW Instructor Course, and realization of several high level international exchange agreements. Additionally, through support of the Technology Investment Program and the ongoing development of future

technologies such as the Vehicle Mounted Active Denial System (VMADS) and the Vessel Stopper System (VSS), the JNLWP continued to lay the groundwork for its mission to put the capability of non-lethal weapons into the hands of the warfighters.

These activities, plus the Program's involvement with the US/UK wargame series, Joint Forces Command's experimentation efforts, Urban Working Group's Joint Urban Operations Study and the initiation of the Joint Mission Area Analysis have all contributed to the recognition that non-lethal weapons have the potential to provide additional capabilities to today's warfighters. Such diverse endeavors have not only allowed the Program to build off current competencies, but to venture into new territories of cooperation, coordination and information sharing among others with vested interest in non-lethal weapons. The continual refinement of these relationships, as well as the emerging new concepts and ideas which result, are expected to continue to advance the program and provide a wider operational continuum for non-lethal weapons.

As for the coming year, the JNLWP will pursue the refinement and update of the Management Plan and publish the JNLWP Master Plan. These, coupled with the Experimentation Plan and Concept Exploration Programs, will assure the Program's increased effectiveness and stability. Building upon this solid foundation will allow the JNLWP to seek additional opportunities that will advance the use, effectiveness, and military utility of existing and prospective non-lethal technologies through the year 2000 and beyond.





# Year in Sight

Joint Non-Lethal Weapons Program - Year 2000 Calendar of Events

Activity Name	Start Date	Finish Date	2000											
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
RIG	1/4/00	1/7/00	○											
RIG	4/20/00	4/21/00				○								
RIG	8/1/00	8/2/00							○					
JCIG	2/10/00	2/10/00		○										
JCIG	7/7/00	7/7/00							○					
IPT	3/2/00	3/2/00			○									
CAO	3/21/00	3/23/00			○									
CAO	6/6/00	6/8/00						○						
CAO	9/20/00	9/22/00									○			
NL JMAA	3/27/00	3/31/00			○									
JIPT	7/28/00	7/28/00							○					
Director's Reviews	5/15/00	6/15/00					○	○						
JFCOM LOE 001	1/17/00	1/28/00	○	○										
JFCOM RDO Workshop	1/11/00	1/13/00	○											
JFCOM RDO Wargame	3/13/00	3/16/00			○									
US/UK Urban Ops Sem.	1/19/00	1/21/00	○											
US/UK Wargame 1 / Sem.	4/4/00	4/7/00				○								
US/UK Wargame 2 / Sem.	6/13/00	6/16/00						○						
US/UK Wargame 3 / Sem.	9/12/00	9/15/00									○			
US/UK Urban Ops Exec. Sem.	10/30/00	10/31/00										○		
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec

# ANNEX A

**JOINT NON-LETHAL WEAPONS**

**PROGRAMS**

**AND**

**REQUIREMENTS**

# Modular Crowd Control Munition (MCCM)

**Ground Emplaced (GE)**

JA - USA & USMC  
JI - USAF & SOCOM  
NI - USN



- Stop, confuse, disorient and/or temporarily incapacitate area targets at close range
- Disperse hostile crowds, integrate into layered perimeter defense
- USA ORD - 20 Jun 98, USMC ORD - 28 Aug 98
- 5-15 meter effective range
- MS III - 16 Jul 99
- Technical Manual, Tactics, Techniques & Procedures, Front Cover Lethality and Tripline development will be worked during MCCM VMS EMD Phase
- Estimated cost - \$255 per munition
- NSN 1377-01-464-2606, DODIC - WA97





# Portable Vehicle Arresting Barrier (PVAB)

Joint Acquisition (JA) - USA & USMC  
Joint Interest (JI) - USAF, USN & SOCOM



- Pre-emplaced Capture System
- Stop a 7500 lb vehicle traveling up to 45 MPH



- Area Denial at a checkpoint or entryway to a high value asset or facility
- Emplaced by 3 people in less than 2 hours



- USA ORD signed 8 Jun 98, USMC ORD signed 24 Aug 98
- MS I/II on 24 Sep 98, MS III in 3QFY00
- \$25K estimated cost per system

# **Modular Crowd Control Munition (MCCM)**

**Vehicle Mounted System (VMS)**

**JA - USA & USMC  
JI - USAF & SOCOM  
NI - USN**

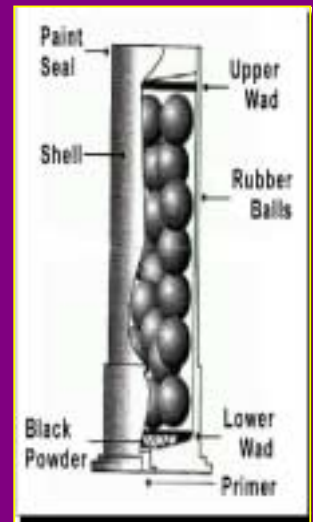


- **Stop, confuse, disorient and/or temporarily incapacitate area targets at close range**
- **Disperse hostile crowds & protect vehicles**
- **USA ORD - 20 Jun 98, USMC ORD - 28 Aug 98**
- **5-15 meter effective range**
- **Integrate onto 5 vehicle types with 4 sided coverage**
  - **M1025, M1026 & M1098 (HMMWV)**
  - **2.5 & 5 ton cargo trucks**
  - **Unique attaching hardware / universal mounting bracket**
  - **5 firings per bracket**
- **MS II - 2QFY00, MS III - 4QFY00, MR-2QFY01**
- **Estimated cost - \$3,707 per system**

# 40mm NL Crowd Dispersal Cartridge (NLCDC)

JA - USA, USMC, & USCG  
JI - USAF, USN & SOCOM

- Fired from M203 40mm grenade launcher
- 15-30 meter effective range
- Deter, delay and/or distract for crowd control
- Multiple rubber balls



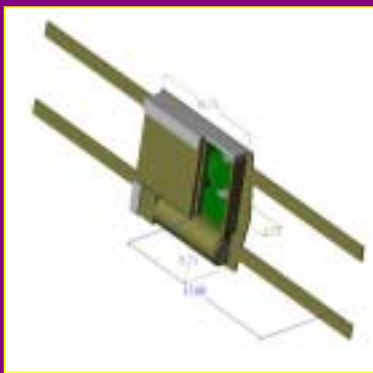
- USA ORD - 24 Jun 98
- USMC ORD - 28 Aug 98
- MS I/II on 19 Apr 99, MS III in 2QFY01
- EMD Contract awarded to DEFTECH on 10 Dec 99
- \$17 estimated cost per .48 caliber ball round



# Non-Lethal Rigid Foam System (NLRF)

JA - USA & USMC  
JI - USAF, USN & SOCOM

- Temporarily delay access to buildings
- Temporarily disable selected equipment (power grid, phone switch)
- Secure caltrops, razorwire, form speedbumps



- Handheld “BIC” pen type dispenser
- 15 minute cure time, 0-100 degree operating temperature
- MS II in 3QFY00, MS III in 1QFY02
- ~ \$57 cost per System
- Shelf life requirement concern



# 66mm Vehicle Launched NL Grenade Program

## ➤ Fired from M7 LVOSS

66mm discharger

## ➤ Flash Bang & Stingball (450 Beads)

JA - USA & USMC

JI - USAF & SOCOM

Notional interest (NI) - USN



- Effective range:  
50 - 100 meters
- 10 meter effective radius
- Smoke & CS Rounds  
exist today  
(30 meter range)



- USA ORD - 1 Sep 98
- USMC O&O - 26 Mar 99
- \$1,900 LVOSS launcher cost
- Estimated cost \$80 per munition
- MS I on 28 Jun 99, MS III in 1QFY01



# Non-Lethal Slippery Foam (NLSF)

JA, JI, NI - TBD

- Very low friction substance disbursed over roadways and/or walkways
  - Chemical non-hazardous spray system
- Control and/or isolate personnel, equipment and areas (interior or exterior)
- 1997 ECBC & SwRI 6 month investigation
- Concept Exploration Program contract awarded: 1) literature search, 2) laboratory evaluation, 3) prototype dispensing system and 4) field evaluation
- USMC ORD - 11 Aug 98, USA O&O Plan pending
- MS 0 - 6 May 99, MS I - 4QFY00
- IOC - 1QFY03, FOC - FY05



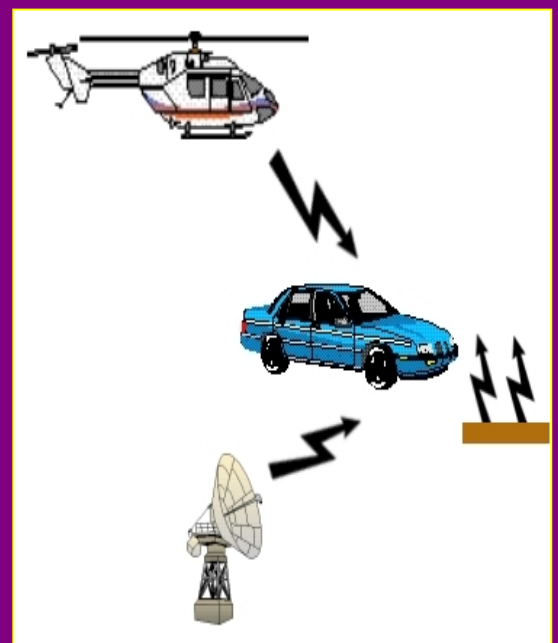


# Ground Vehicle Stopper (GVS) Program

JA, JI, NI - TBD



- Use electromagnetic energy to electrically stop vehicles
- Intercept, disable vehicles, create exclusion zones
- Canalize or reroute convoys, protect high priority assets
- Gasoline & diesel engines (w/electronic fuel controls)
- Draft USA ORD - Sep 98
- MS 0 in 2QFY00, MS I in 4QFY02
- Vehicle target susceptibility study completed
- GVS field test @ China Lake in May 00



# Vessel Stopper System (VSS)

JA, JI, NI - TBD

- **Stop non-cooperating vessels at sea for boarding & search**
  - Sanction violators    - Crime & violence    - Smugglers
  - Arms traffickers    - Weapons of Mass Destruction
- **USN looking at “System of Systems” to stop 20 - 400 ft vessels**
  - Water Bucket                      - Water Cannon                      - Engine Arrester
  - Directed Energy                      - Prop Tanglers
- **Displacement Hulls**
  - Downselected Stack Blocker as prime candidate technology
  - MS 0: 1QFY00                      MS I/II: TBD                      MS III: 2QFY02
- **Planing Hulls**
  - Conducting early operational assessment (EOA) on Running Gear Entanglement System (RGES)
  - Surface Deployment MS 0: 1QFY00                      MS I/II: TBD  
MS III: 1QFY01
  - Air Deployment                      MS 0: 1QFY00                      MS I/II: TBD  
MS III: 4QFY01
- **Capstone Requirements Document (CRD) is approved and validates the need for a non-lethal VSS**



# Active Denial Technology (ADT) Program

JA, JI, NI - TBD

- **NL Directed Energy System**
  - **AFRL (Kirtland AFB) accomplishing hardware development**
  - **AFRL (Brooks AFB) developing effects data**
- **Currently developing detailed System Design**
- **Modeling and Simulation (HSW, DBBL, MCWL & SOCOM)**
- **FY00 Multi-Service Battlelab Experimentation / Demonstration**
- **AFSOC FY99 Airborne Directed Energy Study**
- **MS 0 in 2QFY01**
- **Man portable & airborne platforms proposed as future JNLW Programs**



# Unmanned Aerial Vehicle (UAV) NL Program

- **ALE-47 Chaff / Flare Dispenser**
  - 26 payload tubes / impulse cartridges activated via RF Link
  - Odorant (20ml), Electronic Noise (120dB Siren) & Inert
- Other payloads - Tear Gas, Caltrops & Dye Markers
- Tactical UAVs including Micro VTOL
- I MEF demonstration with Dragon Drone pending
- Multiple Service Experimentation Programs
- USMC (Requirements Lead) determining Service requirements
- Program put on-hold pending platform selection & requirements definition





# Joint Integration Project (JIP)



- Increase commonality between the:
  - USMC Capability Sets
  - USA Contingency Stock & Future Capability Sets
  - USAF & USCG Future Capability Sets
- Primarily focused on Commercial Off-The-Shelf & Non-Developmental Item assets - selecting, testing & acquiring common items, abbreviated acquisition programs





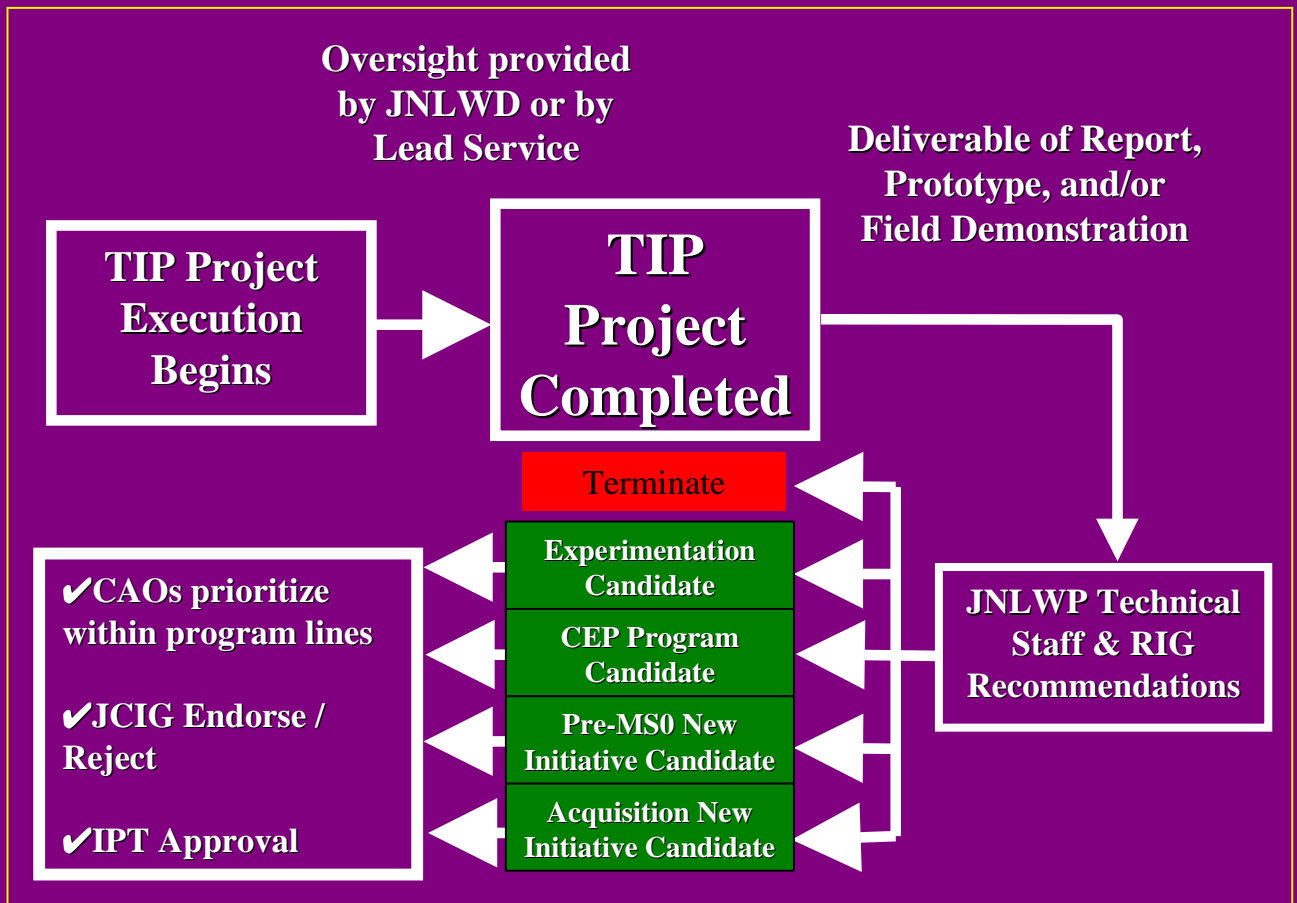
## **ANNEX B**

### **JOINT NON-LETHAL WEAPONS PROGRAM**

# **TECHNOLOGY INVESTMENT PROGRAM**

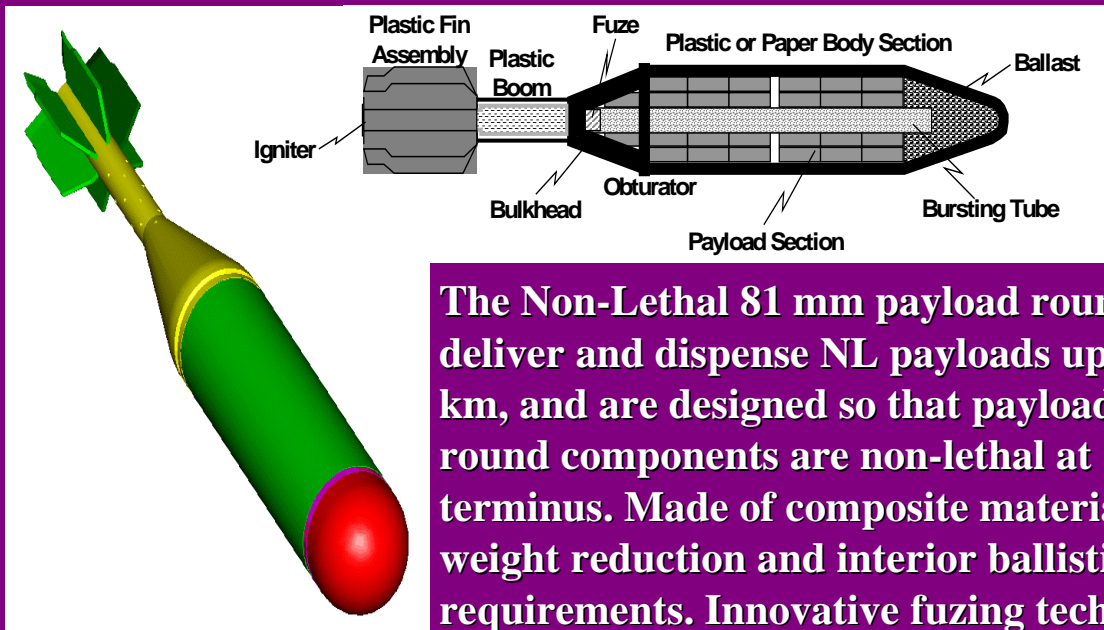


The Technology Investment Program (TIP) was established within the Joint Non-Lethal Weapons Program for the purpose of supporting gaps identified relative to the core capabilities for NLWs by funding short (1-2 year) initiatives with specific deliverables. There is a continuous need within the NLW community for new ideas and technologies to be identified and brought forward. Technology investment is intended to stimulate government laboratories, industry, and academia to generate new technological concepts that expand the utility of NLW in tomorrow's battlespace. The evaluation criteria for the TIP is that the proposal must be worthy of technology investment funding, responsive to the solicitation, technically feasible, have clear objectives and deliverables, and it must meet the schedule at a reasonable cost. The technology proposed should be one of advancing state-of-the-art which can be efficiently supported logistically by the military. The graphic below describes the TIP transition process.





# Non-Lethal 81mm Mortar



The Non-Lethal 81 mm payload round will deliver and dispense NL payloads up to 1.5 km, and are designed so that payload and round components are non-lethal at terminus. Made of composite materials for weight reduction and interior ballistics requirements. Innovative fuzing techniques

are designed to dispense submunitions above target and reduce kinetic energy. Aerodynamic stability is required for round accuracy.

## Frangible Mortar

The objective is to produce a 120mm NL mortar munition using non-traditional materials to limit collateral damage from residual fragmentation of the projectile. Current study investigates potential combustible mortar projectile structural material(s). Material candidate(s) include combustible felted fiber and other combustible composites.

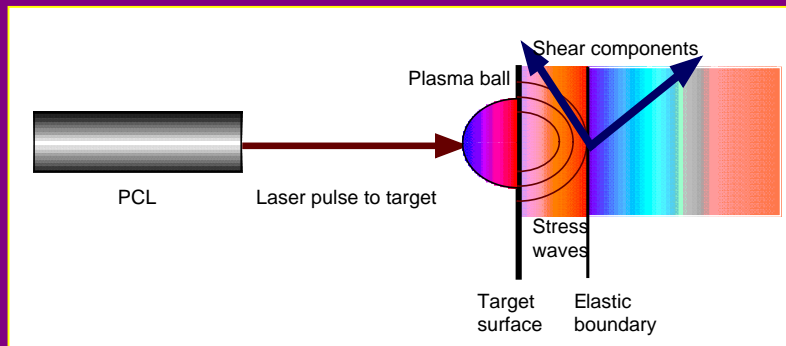


# Airborne Tactical Laser

The Airborne Tactical Laser (ATL) provides ultra-precision engagement with graduated effects on target and system-level capabilities to support non-lethal engagements. It is also used for surveillance to detect and identify aimpoints, engagement selection / assessment, and battle management / control. The ATL uses a lightweight low altitude (COIL) laser with a sealed exhaust.



# Pulsed Chemical Laser



An invisible laser pulse strikes a target and creates an intense shrapnelless flash-bang burst. The following pressure pulse will cause reversible disabling effects. Technologies being pursued include: surface discharge initiated PCL, laser induced plasma pressure sensor, and biosimulants with shear wave sensors. Computer models exist which can model all pulsed laser beam properties and target effects.

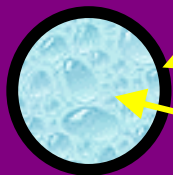
# Odorous Substances

This project investigates odorants and their effects on behavior. It can be used for riot control, to clear facilities, to deny an area, or as a taggant. The technologies used are sensory odorants sealing technology, with a variety of delivery techniques.

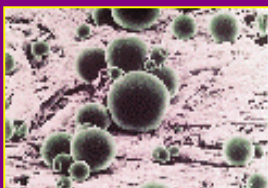


## Microencapsulation

Wall material with properties specific to application



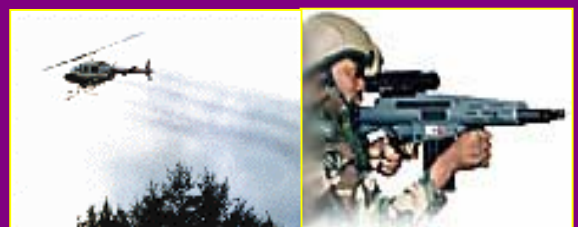
Active material



The microencapsulation project identifies the best suited encapsulation techniques for anti-materiel and anti-personnel NLWs related to area denial and vessel stopping. Encapsulated techniques being pursued are those which will release and spread a variety of chemical payloads upon pressure, contact with water, or at a specific temperature.



Primary Delivery

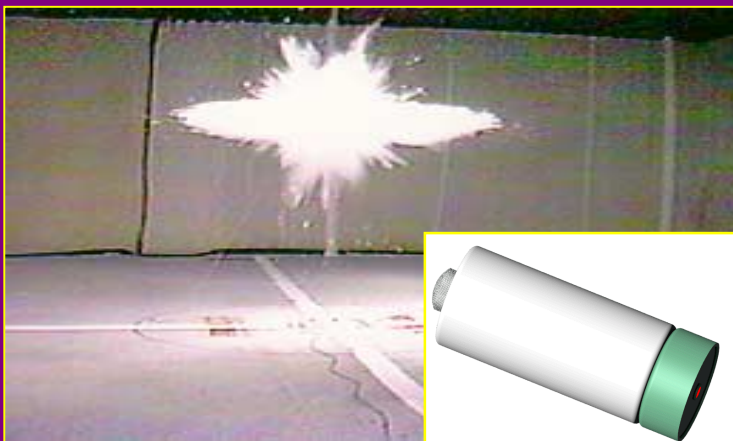


# Bio-Materials Survey

The University of New Hampshire is concentrating on the organizations involved in the research or commercialization of certain biomaterials. Information on the chemical and physical properties of these materials is also being gathered, and when possible, researchers who are leaders in appropriate fields are being contacted. The data will be interpreted with regards to biomaterial class, function, characterization and organizations involved in research or commercial production of the biomaterial, and/or development of NLW technologies using this biomaterial.

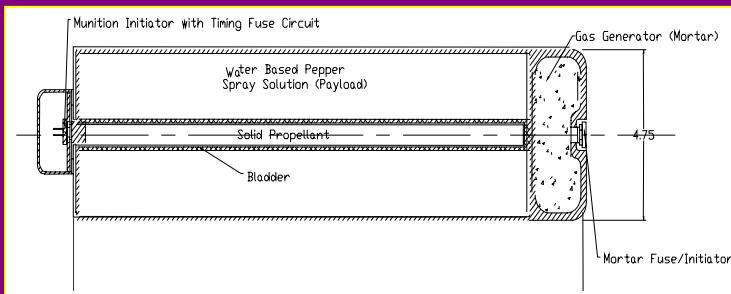


## Overhead Liquid Dispersal System



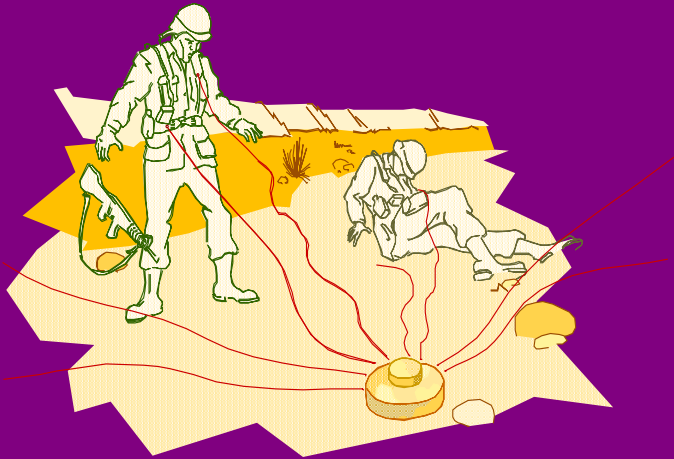
The OLDS canister is fired overhead of target and deployed using an existing CLADS launcher. It provides the ability to rapidly disperse non-lethal chemical agents over large areas.

The project is currently confirming that the dispersal pattern demonstrated in a static test can be performed while the system is in motion and that it can safely disperse agent and survive the launch load.





# Taser Landmine



The pre-concept exploration effort utilizes the commercial off-the-shelf Taser unit currently used by law-enforcement agencies.

The Taser provides a non-lethal area denial device that is effective against dismounted targets. It fires small darts attached to wires that deliver an incapacitating electrical current. Physiological studies have demonstrated that the “pulse” from a single Taser unit to be not only capable of rendering its target incapacitated for several minutes, but also safe in the respect of being well below lethal with no lasting after effects.

# NLW Guided Projectile

The JNLWD has tasked Raytheon to conduct R&D of NL technologies, to include the feasibility of employing the Extended Range Guided Munition (ERGM).

Recently the scope of investigation has focused not only on ERGM as a viable means to deliver NL payloads (such as foams and irritants), but to include existing long range delivery vehicles such as mortars, shoulder launched weapons, artillery, missiles, guided bombs and UAVs for potential NL missions such as area denial and clear facilities.



# **Year 2000**

## **TIP Completion Dates**

- **January**
  - **Taser Landmine**
  - **Odorous Substances**
  - **OLDS**
- **February**
  - **Frangible Mortar Casing**
  - **Pulsed Chemical Laser**
- **April**
  - **81mm NL Mortar**
- **May**
  - **Airborne Tactical Laser**
- **June**
  - **Biomaterials Survey**
- **September**
  - **Microencapsulation**
- **November**
  - **NL Guided Projectile**